

Work Order ID 145021

April 29, 2016 10:45:22 AM

145021

Page 1

Item ID: D412-664-203TRN

Accept

N900040100Setup Start ***NS1***

Revision ID:

Item Name: Crosstube Turning Detail

Stop ***NS2***

Start Date: 5/2/2016 Start Qty: 1.00

1

Cust Item ID:

Required Date: 5/24/2016 Req'd Qty: 1.00

1

Customer:

Reference:

20160429

Approvals:

Process Plan: SH

Date: _____

Tooling: _____

Date: _____

Run Start ***NR1***

QC: _____

Date: _____

SPC (Y/N): _____

Date: _____

Stop ***NR2***

Sequence ID/ Work Center ID	Operation Description	Set Up/ Run Hours	Tool ID	Tool #	Plan Code	Accept Qty	Reject Qty	Reject Number	Insp. Stamp
Draw Nbr	Revision Nbr								
D412-664-243	F								

100

0.36

100

MORI SEIKI CNC LATHE LARGE

Mori Seiki

Memo

1.14

Mori Seiki CNC Lathe Large

1-Fill tube with sand & install plugs 412-203 on both ends as per Folio FA166
2-Face both sides of tube
3-Turn first taper section on both side as per Folio FA166
4- blend transition lines using belt sander with 60 grit sandpaper
FOLIO REV: AA
DWG REV: F

DAS
49
9-89

110

QC2- Inspect parts off machine FAI/FAIB

0.00

110

QC

Memo

0.00

Quality Control

DAS
49
9-89

DQA: _____ Date: _____



WORK ORDER NON-CONFORMANCE / UPDATE

QA Closed: _____ Date: _____

Work Order update only ☐

Work Order: _____ Part No. _____ NCR No. _____	DISPOSITION Rework ☐ Scrap ☐ Use-as-is ☐ Suspected Unapproved ☐	AGAINST DEPARTMENT/PROCESS Skid-tube ☐ Machining ☐ Thermoforming ☐ Large Fab ☐ Cross tube ☐ Small Fab ☐ Finishing ☐ Composite ☐ Water Jet ☐ Prod. Eng. Coord. ☐ Rec/Store/Packaging ☐ Supplier ☐ Engineering ☐ Quality ☐ Other ☐			
Date :	Step #:	QTY Effective :		MRB (QSI042) Approval	
Description Work Order Deviation		Disposition			
				Completed By	
				Lead hand / Supervisor Approval Verification	
				QC / QA Coordinator Approval	
Root Cause Environment ☐ Design ☐ Doc/Data ☐ Equip/Tooling ☐ Handling/Pre ☐ Material ☐ Internal Transport ☐ Tribal Knowledge ☐ LOA ☐ Substation ☐ Past Expiry Date ☐ Misidentified ☐ No Re-verification ☐ Operator ☐ Offset/Setup ☐ Supplier ☐ Training ☐ Use for Testing ☐ Poor Information ☐ Rushing ☐ Product Improvement ☐ Process Improvement ☐ Manufacturing Process ☐ Past Due ☐		FAULT CATEGORY Pressure/Forced ☐ Bending ☐ Centre Not Concentric ☐ Cracks ☐ Crimp/Kink/Ripple/Wave ☐ Cuffs ☐ Crushing ☐ Heat Treat ☐ Wave/Twist in Tube ☐ Marks/Chatter ☐ Temperature/Cure ☐ Set-up ☐ BOM/Route ☐ Broken/Damage/Defect ☐ Inspection Incomplete/Unqualified ☐ Contamination ☐ Countersink ☐ Cut Too Short ☐ Instructions Incomplete/Unclear ☐ Drill Holes ☐ Power Loss/Surge ☐ Folio/Program ☐ Grain ☐ Weld ☐ Wrong Stock Pulled ☐ Out of Sequence ☐ Off-set ☐ Misabeled ☐ Fit/Function ☐ Misaligned/off center ☐ Positioned Wrong ☐ Outside Dimensions ☐ Over/Under tolerance ☐ Part Incorrect ☐ Part Lost/Missing ☐ Part Moved ☐ Drawing ☐ Finish ☐ Misread ☐ Turning Sequence ☐			
OTHER : ☐					

DQA: _____ Date: _____



WORK ORDER NON-CONFORMANCE / UPDATE

QA Closed: _____ Date: _____

Work Order update only ☐

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Work Order ID 145021

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145021

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Item ID: D412-664-203TRN

Accept

N900040100Setup Start ***NS1***

Revision ID:

Item Name: Crosstube Turning Detail

Stop ***NS2***

Start Date: 5/2/2016 Start Qty: 1.00

1

Cust Item ID:

Required Date: 5/24/2016 Req'd Qty: 1.00

1

Customer:

Reference:

Approvals: Process Plan: _____ Date: _____ Tooling: _____ Date: _____

Run Start ***NR1***

QC: _____ Date: _____ SPC (Y/N): _____ Date: _____

Stop ***NR2***

Sequence ID/ Work Center ID	Operation Description	Set Up/ Run Hours	Tool ID	Tool #	Plan Code	Accept Qty	Reject Qty	Reject Number	Insp. Stamp
145		0.00							
145									
Crosstubes	Memo	1.00							
Crosstubes	GRIND ONLY TRANSITION LINES SMOOTH LONGITUDE WAY.								
150		0.00							
150									
HandFXtube	Memo	0.58							
Hand Finishing Crosstubes	1- PRESSURE WASH X-TUBE INSIDE AND OUT								
	2- ALODINE AND ACID ETCH X-TUBE INSIDE AND OUT. USE RED SCOTCH BRITE								
160	QC7-Inspect Chemical Conversion Coat	0.00							
160									
QC	Memo	0.01							
Quality Control									

DP 16-6-24
JWDP 16-6-27
JW1
DAS
38
JUN 28 2016

DQA: _____ Date: _____



WORK ORDER NON-CONFORMANCE / UPDATE

QA Closed: _____ Date: _____

Work Order update only ☐

Work Order: _____ Part No. _____ NCR No. _____	DISPOSITION Rework ☐ Scrap ☐ Use-as-is ☐ Suspected Unapproved ☐	AGAINST DEPARTMENT/PROCESS Skid-tube ☐ Machining ☐ Thermoforming ☐ Large Fab ☐ Cross tube ☐ Small Fab ☐ Finishing ☐ Composite ☐ Water Jet ☐ Prod. Eng. Coord. ☐ Rec/Store/Packaging ☐ Supplier ☐ Engineering ☐ Quality ☐ Other ☐			
Date :	Step #:	QTY Effective :		MRB (QSI042) Approval	
Description Work Order Deviation			Disposition		
			Completed By		
			Lead hand / Supervisor Approval Verification		
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Work Order ID 145021

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145021

Page 4

Item ID: D412-664-203TRN**Accept*****N900040100*****Setup Start *NS1*****Revision ID:****Item Name:** Crosstube Turning Detail**Stop *NS2*****Start Date:** 5/2/2016 **Start Qty:** 1.00 ***1*****Cust Item ID:****Required Date:** 5/24/2016 **Req'd Qty:** 1.00 ***1*****Customer:****Reference:****Approvals:** **Process Plan:** _____ **Date:** _____ **Tooling:** _____ **Date:** _____**Run Start *NR1*****QC:** _____ **Date:** _____ **SPC (Y/N):** _____ **Date:** _____**Stop *NR2***

Sequence ID/ Work Center ID	Operation Description	Set Up/ Run Hours	Tool ID	Tool #	Plan Code	Accept Qty	Reject Qty	Reject Number	Insp. Stamp
170		0.00							
170	Packaging								
Packaging	Memo	0.00							
Packaging	LOCATION : LG014								
180		0.00							
180	QC21- Final Inspection - Work Order Release								
QC	Memo	0.10							
Quality Control									

[Handwritten signature] 16-6-28

16/6/29 *[Handwritten signature]*

Sta 6/29/16

DQA: _____ Date: _____

**WORK ORDER NON-CONFORMANCE / UPDATE**

QA Closed: _____ Date: _____

Work Order update only ☐

Work Order: _____ Part No. _____ NCR No. _____	DISPOSITION Rework ☐ Scrap ☐ Use-as-is ☐ Suspected Unapproved ☐	AGAINST DEPARTMENT/PROCESS Skid-tube ☐ Machining ☐ Thermoforming ☐ Large Fab ☐ Cross tube ☐ Small Fab ☐ Finishing ☐ Composite ☐ Water Jet ☐ Prod. Eng. Coord. ☐ Rec/Store/Packaging ☐ Supplier ☐ Engineering ☐ Quality ☐ Other ☐			
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OTHER : ☐					

Picklist Print

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Page 1

Work Order ID: 145021

145021

Parent Item: D412-664-203TRN

D412-664-203TRN

Parent Item Name: Crosstube Turning Detail

Start Date: 5/2/2016

Required Date: 5/24/2016

Start Qty: 1.00

Required Qty: 1.00

Comments: IPP Rev:A 08-03-06 new issue DD verified by:eec
IPP Rev B 08.04.02 Removed polish EC verified by: DD

Component Item ID/ Item Name	Replacement Item ID	Mfg/ Purch	Bin Item	Primary Location	Last Location	Route Seq ID	Unit of Measure	Qty on Hand	Qty per Kit	Total Qty	Qty Issued	Date Issued	Status
D6009-129		Manufactured	No			120	Each	48.5000	1	1			

D6009-129

**

Crosstube Material

Location	Loc Qty	Loc Code
LG003	25.5	
107864	16.5	
123974	9	
SHED	23	
123972	23	

 16/6/9

DAS
49
7-89

Item	Qty -243	Part Number	Description
1	X	D412-664-243	CROSSTUBE ASSEMBLY (412 HIGH AFT)
2	1	D6009-129	CROSSTUBE
3	2	D3595-063-570	RUBBER CUSHION
4	1	D2896-1	SUPPORT
5	2	D3189-1	CHAFING SHIELD
7	4	MS21920-28	CLAMP
8	2	MS21920-30	CLAMP (OR MS21920-32)
9	A/R	SCOTCH-WELD DP460	EPOXY ADHESIVE, 3M SCOTCH-WELD
10	A/R	PROSEAL 890 B-2	SEALANT

GENERAL NOTES:

- 1) MATERIAL: MANUFACTURED FROM D6009-129
FINISHED LENGTH = 124.100±0.020 (BEFORE BENDING)
- 2) FINISH: CHEMICAL CONVERSION COAT PER DART QSI 005 4.1
PRIME INSIDE AND OUTSIDE PER DART QSI 005 4.2
MASK UNDERSIDE OF CROSSTUBE AS SHOWN (ZN C6-2, HATCHED AREA)
PAINT OUTSIDE PER DART QSI 005 4.2
AFTER PAINTING, REMOVE MASKING AND APPLY MATTE CLEAR COAT
- 3) TOLERANCES: PER DART QSI 018 UNLESS OTHERWISE NOTED.
- 4) UNITS: INCHES UNLESS OTHERWISE NOTED.
- 5) BREAK SHARP EDGES: 0.005 TO 0.010 MAX.
- 6) IDENTIFICATION: DART P/N 'D412-664-243' AND B/N ON INSIDE OF CUFF PER QSI 044 6.4 (VIBRATING STYLUS)
- 7) WEIGHT: 47.0 lbs
- 8) PART IS SYMMETRIC ABOUT CENTERLINE.
- 9) EXTREME CARE MUST BE TAKEN TO PROTECT THE OUTSIDE SURFACE OF THE TUBE. THE OUTSIDE SURFACE MUST BE SMOOTH AND FREE FROM SURFACE DEFECTS SUCH AS SCRATCHES, NICKS, OR DENTS. DEFECTS UP TO 0.005" MAY BE BLENDED OUT LONGITUDINALLY. CIRCUMFERENTIAL GRIND MARKS ARE UNACCEPTABLE. DO NOT GRIND TUBE AFTER SHOT PEEN.

TURNING

- 10) WHEN TRANSITIONING TO STOCK MAT'L, RUN CUTTER OFF PART. BLEND OUT EDGE LONGITUDINALLY. TRANSITION SHOULD BE SMOOTH.

BENDING

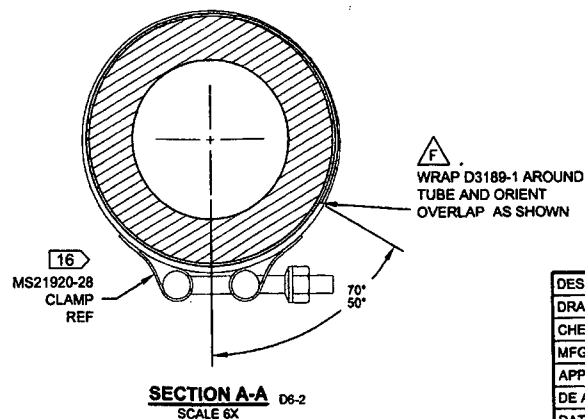
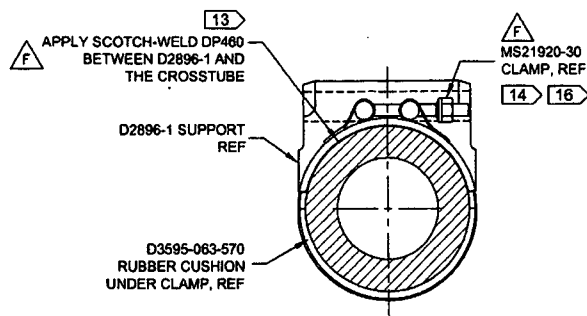
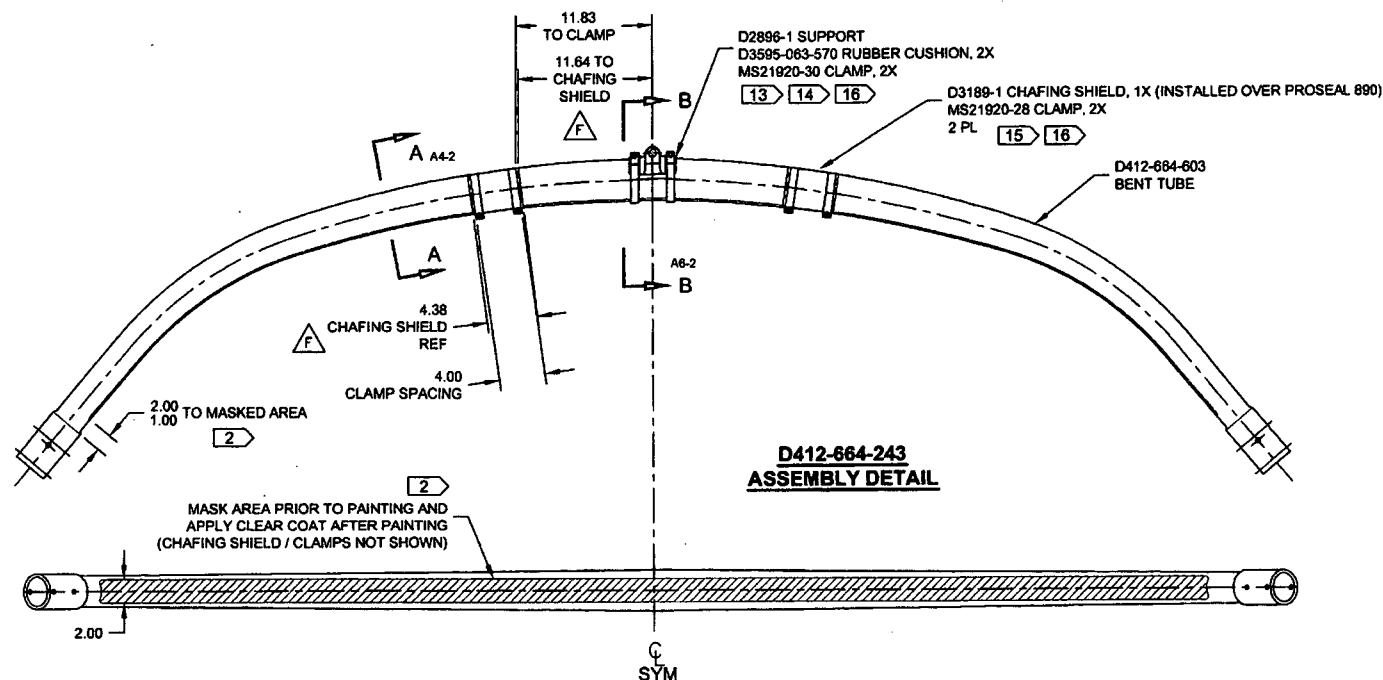
- 11) BEND PROGRESSIVELY WITH A MINIMUM OF 8 PASSES. MAXIMUM TUBE FLATTENING DUE TO BENDING IS 7% (BASED ON O.D.) IN LOWER HALF OF R30 BEND AND 6% (BASED ON O.D.) ON REMAINING TUBE.
- 12) LIQUID PENETRANT INSPECT OUTSIDE SURFACE OF CROSSTUBE PER QSI 038. TO BE PERFORMED AFTER FINAL POST-BEND GRINDING. ANY ADDITIONAL GRINDING REQUIRES ANOTHER LPI INSPECTION.

ASSEMBLY

- 13) INSTALL D2896-1 CENTER SUPPORT USING A 0.04" TO 0.07" THICK LAYER OF SCOTCH-WELD DP460 PER QSI 015.
- 14) INSTALL MS21920-30 CLAMPS (OR -32) WITH D3595-063-570 RUBBER CUSHIONS TO SECURE THE D2896-1 SUPPORT ON TOP SIDE OF THE CROSSTUBE. ENSURE CLAMPS ARE ON TOP SIDE OF CROSSTUBE.
- 15) APPLY A THIN COAT OF PROSEAL 890 ON INSIDE CONCAVE SURFACE OF D3189-1 CHAFING SHIELD AND LET CURE PER MANUFACTURER'S INSTRUCTIONS. INSTALL PROSEAL D3189-1 CHAFING SHIELD ONTO CROSSTUBE BY APPLYING A THIN COAT OF PROSEAL 890 ONTO CROSSTUBE. BE SURE TO ELIMINATE ANY AIR GAPS.
- 16) TORQUE CLAMPS ON D2896-1 SUPPORT 80 TO 100 IN.-LB. TORQUE CLAMPS ON D3189-1 CHAFING SHIELD 40 TO 50 IN.-LB. ENSURE AT LEAST 1.5 THREADS SHOWING IN SAFETY AND THAT NUT HAS NOT BOTTOMED-OUT AFTER TORQUING. PRIOR TO PACKAGING, RE-CHECK TORQUE ON CLAMPS AFTER ADHESIVES HAVE CURED FOR 24 HOURS.

RELEASED
 2014-05-26
 Apr 29/16
 SH 1450021

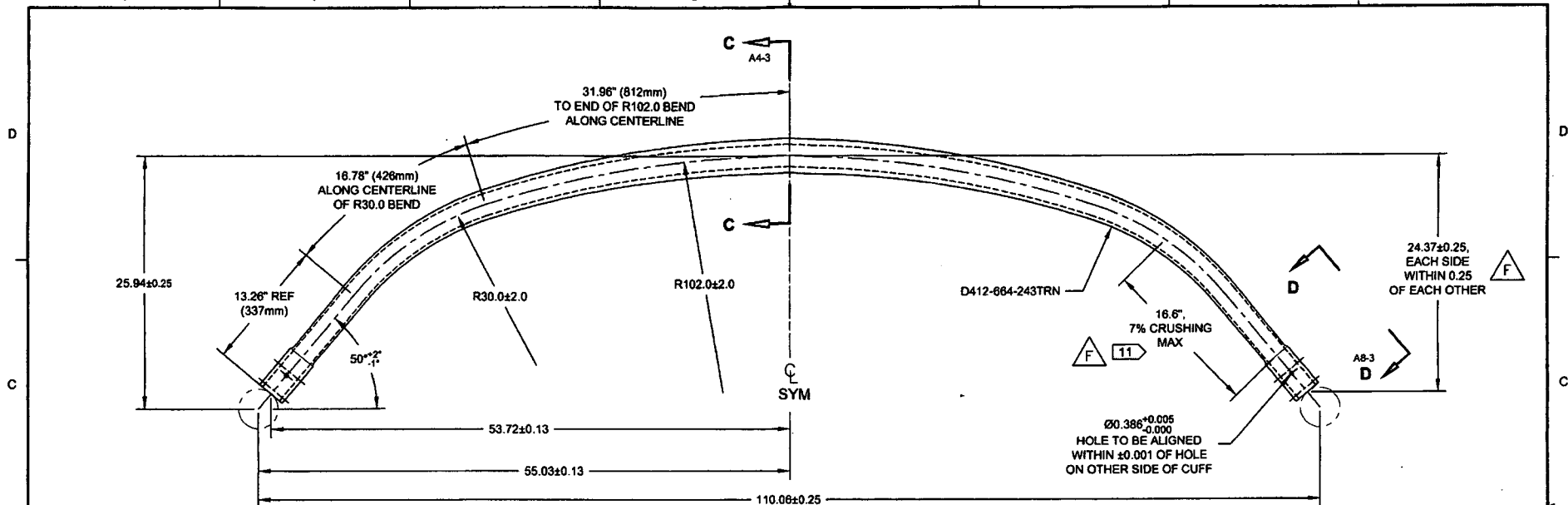
F	NOTES RE-ORDERED, SCOTCH-WELD WAS MAGNOBOND (C8-1), ADD CLAMP RETORQUE (A8-1), REMOVE ABRASION STRIP, ADD INSPECTION WINDOW (C8-1), CHAFING SHIELD NOW 4.38 WIDE (C6-2), ADD 7% CRUSHING (B8-1), CHG BEND HEIGHT TOL. TO ±0.25 (C1-3), CHG CUFF TOL. (D2-4), CLAMPS FLIPPED TO PREVENT CHAFING (B7-2, B7-3), INCORP. DEO E-2-4	CP	14.04.01
E	REFORMAT/REVISE GENERAL NOTES; REORGANIZED VIEWS AND REFORMATTED DRAWING TO CURRENT STANDARDS; RELOCATED FLAG #6 PER PAR 08-046 (ZN A6-3); ADD TOLERANCE (ZN B6-3, C4-3, C8-3 & C5-3); MOVED TURNING DETAIL & UPDATED TOLERANCE TO SHEET 4.	RF	09.08.30
D	REMOVE D2732-058, CHANGE TO D3595-063-570	PH	07.03.09
C	REMOVE D2856-800-1087, ADD D2732-058 & MAGNOBOND 8398, MS21920-32 WAS MS21920-30	MB	06.10.27
B	ADD HOLES FOR COMPATABILITY WITH BHT/AA SKIDTUBES	PH	05.02.04
A	NEW ISSUE	PH	01.10.17
REV.	DESCRIPTION	BY	DATE
DESIGN	DP	DART AEROSPACE LTD	
DRAWN	DP	HAWKESBURY, ONTARIO, CANADA	
CHECKED	DW	DRAWING NO.	REV. F
MFG. APPR.	RA	D412-664-243	SHEET 1 OF 4
APPROVED	IN	TITLE	SCALE
DE APPR.	SH	CROSSTUBE ASSEMBLY (412 HI AFT)	NTS
DATE	14.04.01	COPYRIGHT © 2001 BY DART AEROSPACE LTD THIS DOCUMENT IS PRIVATE AND CONFIDENTIAL AND IS SUPPLIED ON THE EXPRESS CONDITION THAT IT IS NOT TO BE USED FOR ANY PURPOSE OR COPIED OR COMMUNICATED TO ANY OTHER PERSON WITHOUT WRITTEN PERMISSION FROM DART AEROSPACE LTD.	



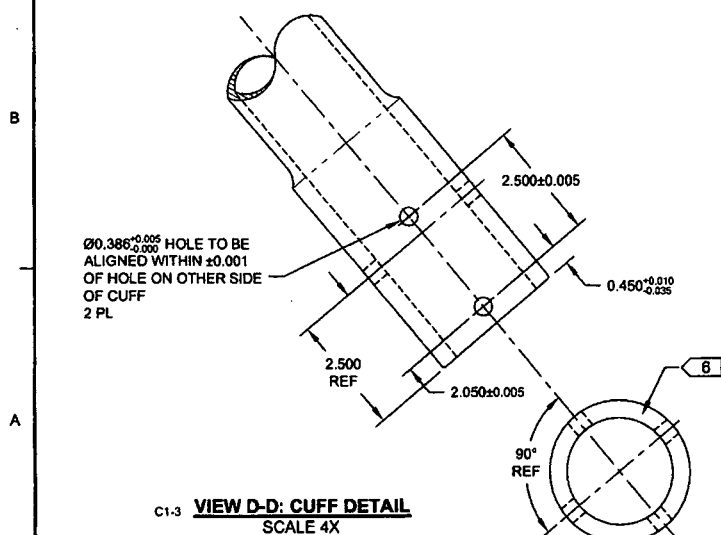
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DESIGN		DART AEROSPACE LTD
DRAWN		HAWKESBURY, ONTARIO, CANADA
CHECKED		DRAWING NO. REV. F
MFG. APPR.		D412-664-243 SHEET 2 OF 4
APPROVED		TITLE SCALE
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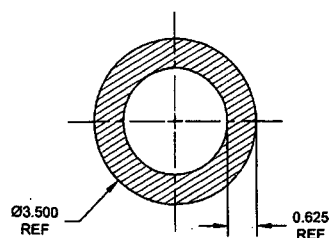
8 7 6 5 4 3 2 1



D412-664-603
BENDING AND DRILLING DETAIL



C1-3 **VIEW D-D: CUFF DETAIL**
SCALE 4X

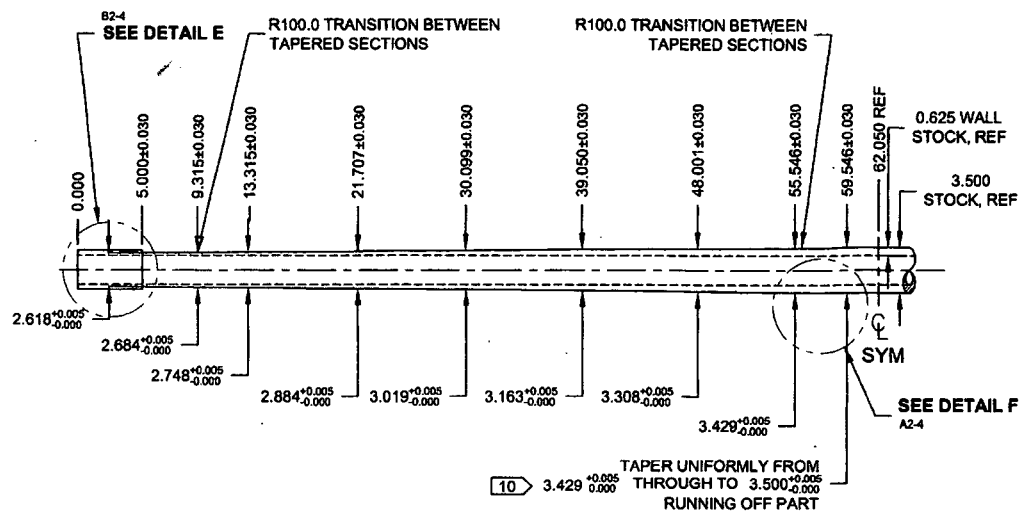


SECTION C-C D5-3
SCALE 4X

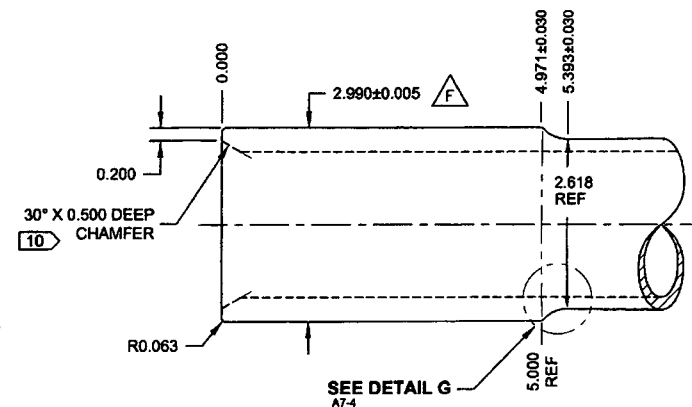
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DRAWN		HAWKESBURY, ONTARIO, CANADA	
CHECKED		DRAWING NO.	REV. F
MFG. APPR.		D412-664-243	SHEET 3 OF 4
APPROVED		TITLE	SCALE
DE APPR.		CROSSTUBE ASSEMBLY (412 HI AFT)	NTS
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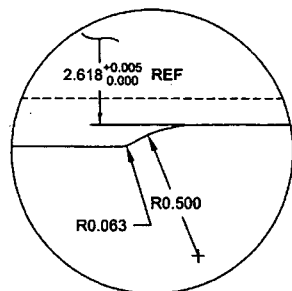
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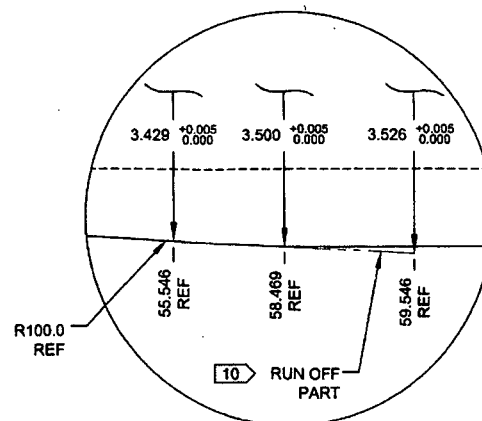
D412-664-243TRN
TURNING DETAIL



DETAIL E:
CROSSTUBE CUFF
SCALE 5X



DETAIL G:
CUFF TRANSITION
SCALE 10X



DETAIL F:
TAPER RUN-OFF
NOT TO SCALE

RELEASED
2014-05-26

DESIGN		DART AEROSPACE LTD
DRAWN		HAWKESBURY, ONTARIO, CANADA
CHECKED		DRAWING NO. REV. F
MFG. APPR.		D412-664-243 SHEET 4 OF 4
APPROVED		TITLE SCALE
DE APPR.		CROSSTUBE ASSEMBLY (412 HI AFT) NTS
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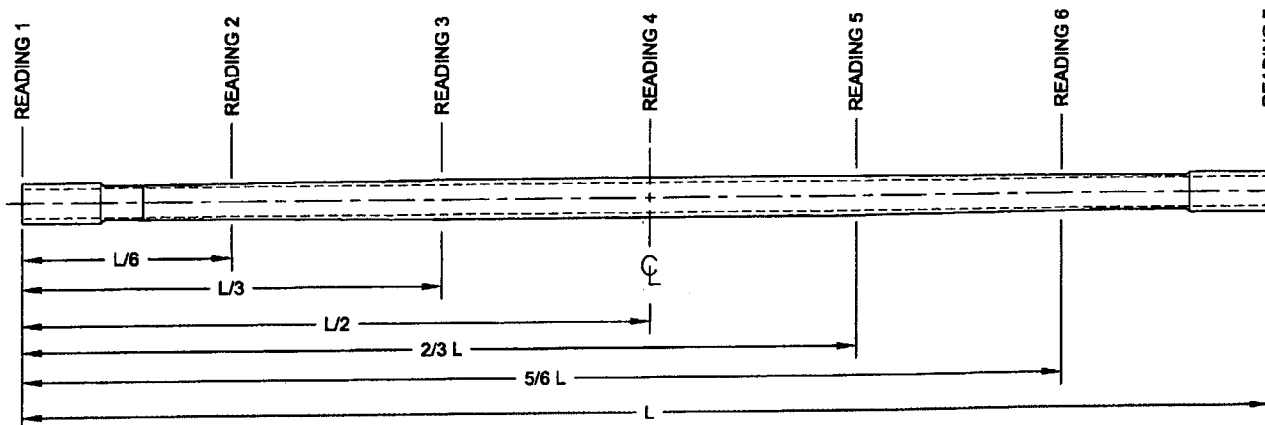
DART AEROSPACE LTD		Work Order:	145021
Description: Crosstube Assembly (412 High Aft)		Part Number:	D412-664-243
Inspection Dwg: D412-664-243 Rev: F		Page 1 of 2	

FIRST ARTICLE INSPECTION CHECKLIST

	Inspection Sheet Drawing Dimension	Tolerance	Actual Dimension	Accept	Reject	Method of Inspection	Comments
SIDE A	2.684	+0.005/-0.000	2.689	✓		Microcnc04	
	2.748	+0.005/-0.000	2.753	✓		↓	
	2.884	+0.005/-0.000	2.889	✓		↓	
	3.019	+0.005/-0.000	3.024	✓		Microcnc05	
	3.163	+0.005/-0.000	3.168	✓		↓	
	3.308	+0.005/-0.000	3.313	✓		↓	
	3.429	+0.005/-0.000	3.431	✓		↓	
	2.990	+0.005/-0.000	2.993	✓		Microcnc04	
	2.618	+0.005/-0.000	2.623	✓		↓	
	0.200	+/-0.010	0.200	✓		Verncnc08	
	R0.063	+/-0.010	R0.063	✓		RG	
	R0.500	+/-0.010	R0.500	✓		RG	
	4.971	+/-0.030	4.971	✓		↓	
SIDE B	2.684	+0.005/-0.000	2.689	✓		Microcnc04	
	2.748	+0.005/-0.000	2.753	✓		↓	
	2.884	+0.005/-0.000	2.889	✓		↓	
	3.019	+0.005/-0.000	3.024	✓		Microcnc05	
	3.163	+0.005/-0.000	3.167	✓		↓	
	3.308	+0.005/-0.000	3.313	✓		↓	
	3.429	+0.005/-0.000	3.431	✓		↓	
	2.990	+0.005/-0.000	2.992	✓		Microcnc04	
	2.618	+0.005/-0.000	2.622	✓		↓	
	0.200	+/-0.010	0.200	✓		Verncnc08	
	R0.063	+/-0.010	R.063	✓		RG	
	R0.500	+/-0.010	R.500	✓		RG	
	4.971	+/-0.030	4.971	✓		↓	
	124.100	+/-0.020	124.100	✓		tape	

DART AEROSPACE LTD	Work Order:	145021
Description: Crosstube Assembly (412 High Aft)	Part Number:	D412-664-243
Inspection Dwg: D412-664-243 Rev: F		Page 2 of 2

WALL THICKNESS MEASUREMENT



Location	WALL THICKNESS MEASUREMENT (IN)				Deviation Δw (max-min)	TOLERANCE
	w1	w2	w3	w4		
READING 1 L= 0"	.387	.369	.370	.389	0.020	0.073"
READING 2 L= 20.883	.355	.297	.285	.347	0.070	
READING 3 L= 41.366	.508	.463	.464	.509	0.045	
READING 4 L= 62.049	.637	.623	.629	.650	0.022	
READING 5 L= 82.732	.484	.480	.487	.490	0.010	
READING 6 L= 103.415	.322	.310	.302	.311	0.020	
READING 7 L= 124.098	.390	.361	.367	.393	0.032	

Calibration Result

Actual Block Thickness: 500-750

Sitescan 250 Measured Thickness: 500-750

DAS
49
7-89

DAS
47
9-89

Measured by: <i>[Signature]</i>
Date: <i>16/06/21</i>

Audited by: <i>[Signature]</i>
Date: <i>16-06-22</i>

Preliminary Approval:
Date:

Rev	Date	Change	Revised by	Approved
A	04.06.16	New Issue (P/O D412-664-203)	KJ/JLM	
B	06.03.09	Dwg Rev updated	KJ/JLM	
C	07.05.08	Tolerance updated for dimension 4.971	KJ/JLM	
D	10.02.02	Dimension 124.100 was 124.09	KJ	
E	12.06.04	Wall thickness form added	KJ	
F	14.06.24	Dwg Rev updated	KJ	<i>[Signature]</i>